REMARKS

Reconsideration of the rejection of all claims 1-7 under 35 USC § 103 is respectfully requested in view of the enclosed Declaration Under 37 CFR 1.132.

Applicants have discovered that the frictional engagement of the grains or chips of the source of zinc ions and the grains or chips of zinc dissolution accelerating metal maintains the source of zinc ions and zinc dissolution metal activated on their surfaces there of resulting in an unexpectedly high zinc ion dissolution rate. As stated in paragraph [0012] of the specification:

> The source of zinc ions and the zinc dissolution accelerating metal are put in the same vessel and brought into direct contact with each other or put in different vessels and connected via an electric conductor, and the vessel or vessels are shaken, vibrated or rotated, etc. in a plating solution to move the source of zinc ions and the zinc dissolution accelerating metal, which causes agitation of solution and mutual friction of metal surfaces and accelerates the zinc dissolution. Moreover, the friction maintains an activated state of the surface of the source of zinc ions and the zinc dissolution accelerating metal and keeps the dissolution rate high.

The importance of the zinc source and the zinc dissolution accelerating metal being (1) in the form of grains or chips; and (2) in frictional engagement with other grains or chips as a result of the claimed shaking, vibrating or the vessel(s) provide an unexpectedly fast dissolution rate, as shown in Tables 1 and 2 of the specification (pages 12 and 13, copies attached.

The outstanding office action, and previous office actions indicate that connection, e.g., stirring is know to increase the dissolution rate.

In fact, all data collected for Tables 1 and 2 of the specification (for the data of the Examples and the Comparative Examples) were subjected to substantial convection forces as a result of a constant recycle rate of 10 Liters/minute, or two recyclings per minute between a 3 Liter plating both and a 2 Liter dissolution bath. Only the data of the Examples

(not Comparative Examples) included the frictional contact – the difference in dissolution rates was unexpected, as described in the enclosed Declaration of first named inventor Osamu Sekiguchi.

Applicants' claims call for more than providing increased connection in the zinc source and in the zinc source and in the zinc dissolution bath. The claims require friction contact between the grains or chips of the zinc dissolution metal and between the grains or chips of the zinc source in order to maintain an activated state of the surface of both.

In the prior art, zinc ions are usually supplied by convection and/or circulation such as by pump. However, as discovered by Applicants herein, the efficient supply of zinc ions necessary for efficient zinc plating cannot be achieved only by such circulation. The present inventors have found that supply of zinc ions is remarkably enhanced by the method wherein a vessel or separate vessels containing directly or indirectly electrically connected source of zinc ions and zinc dissolution accelerating metal, both in the form of grains or chips, is or are shaken, vibrated or rotated in a plating solution, thereby providing frictional engagement of the grains or chips.

In the present invention, it has been unexpectedly found that a mechanical method, as defined in claim 1, of accelerating the dissolution of zinc ions by frictional contact of zinc source and zinc dissolution metals is very effective, as compared to conventional methods. Mere convection or circulation of the solution such as by pump is not sufficient. The grains or chips of the zinc source and the zinc ion dissolution metal are separately or altogether mechanically contacted to each other, which causes friction between the grains or chips which greatly accelerates dissolution of zinc ions. There is no teaching of this frictional contact in the of Mooji et al or Bard et al. references.

Specifically referring to the data in the Examples ([0015]) of the specification of this application, tests were conducted in a system including a zinc electroplating bath and a zinc dissolution bath in which the solution overflowing from the electroplating bath is fed to the dissolution bath and the dissolved zinc solution is pumped back to the electroplating bath. The tests in Tables 1 and 2 were conducted in this same system using a common vessel (a barrel) containing the grains of zinc source and grains of dissolution accelerating metal

(Table 1) and separate vessels (barrels) respectively containing the grains of zinc source and grains of dissolution accelerating metal (Table 2).

The working examples of this invention and the comparative examples are different only in that the vessel or vessels were rotated (examples of the invention) or not (comparative examples) and thus they all include the same degree of convection and circulation of the solution. From these tables, it is apparent that the efficiency of the examples is unexpectedly superior to the comparative examples.

As shown in Tables 1 and 2, as described in the Declaration of Osamu Sekiguchi, the claimed frictional engagement resulted in the following unexpected increases in dissolution times (5th time) without frictional engagement in comparison to the claimed invention.

	Example	**Comparative Example**		**% Increase w/o Friction**
1	360	1	480	n/a
2	300	2	480	n/a
3	120	3	240	100%
4	180	4	360	100%
5	120	5	270	125%
6	120	6	210	75%
		7	480	more than 400%
		8	480	more than 400%
7	300	9	450	50%
8	90	10	180	100%
9	60	11	150	150%
10	60	12	180	300%
11	450	13	480	n/a
12	360	14	480	n/a
13	180	15	480	166%
14	210	16	450	110%

It is submitted that the data of the enclosed Declaration and Tables 1 and 2 of the specification is reasonably commensurate in scope with the claimed subject matter since the frictional engagement of the metal grains or chips, whether by shaking, vibrating or rotating, have the same effect of activating the surface of the metals. Further, the data was collected using three different sources of zinc ions (A., B. and C.); five different zinc

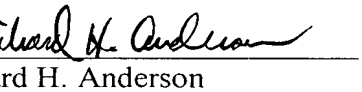
dissolution accelerating metals ((1), (2), (3), (4) and (5)); and four different plating solutions (1., 2., 3., and 4.) (see pages 9 and 10 of the specification).

It is further submitted that no prior art of record discloses or suggests the claimed frictional engagement of zinc source and zinc dissolution metal grains or chips. Since this frictional engagement has been shown to produce unexpected results in comparative testing, it is submitted that the prior art rejections should be withdrawn.

All claims are now of proper form and scope for allowance. Early and favorable consideration is respectfully requested.

Dated: December 21, 2006

Respectfully submitted,

By 

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